

A Multi-granularity Locking Protocol Based on Ordered Sharing Locks in Engineering Databases that Supports Cooperative Design*

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ABSTRACT

The computer supported cooperative design (CSCD) is a useful technology in the field of integrity manufacture. Those traditional concurrency control mechanisms are incompetent to provide highly concurrency for cooperative design transactions. In this paper, a transaction model supporting cooperative design is proposed first. Then, in order to ensure the correctness and consistency of engineering database using the model, an advanced concurrency control mechanism combining multi-granularity locking with ordered sharing locks is presented. According to the characteristics of engineering data objects, a lock instance graph with multi-granularity for engineering database (EDB) is constructed. For supporting cooperative read and modification, the compatible matrix of multi-granularity locking based on ordered sharing locks is also given. In the end, we have proved that any concurrent execution is serializable if it obeys the proposed protocol and no node in the lock instance graph of EDB owns a conflicting lock explicitly or implicitly except ordered sharing locks. And an implemented algorithm of the protocol is also presented finally.

Keywords: computer supported cooperative design (CSCD), concurrency control, multi-granularity locking (MGL), ordered sharing locks